

Solar Battery Charge Controller by KI0BK Operations Manual

Precautions:

The Solar Charge controller should be kept dry and operated only in an area protected from the weather, close to the battery(s) that it is maintaining. Keep wire length (losses) to a minimum between the SBCC and the battery. If long cable runs are needed, they should be between the PV panel and the Solar Battery Charge Controller.

Installation:

Plug in the battery first, then plug in the Solar PV panel. That was easy!

Operations:

LED State Indicator:

The LED displays the following system conditions.

[**OFF**] Night time, or no Sun on PV panel, or no battery connected (note: battery must be above 10v, see below)

[**Solid RED**] The PV panel is charging the battery, (Fast Charge mode)

[**RED/GREEN**] Mostly Red/flashing Green: The battery has reached peak voltage setting. (Absorption mode)

[**GREEN/RED**] Mostly Green/flashing Red: The battery is fully charged. (Float mode)

[**Solid GREEN**] The battery has finished equalizing and returning to Float mode.

[**Flashing RED**] Low light level, (Dawn or Dusk), Trickle charging as power output from panel is low.

[**Flashing GREEN**] Very Low light level, (Dawn), PV Panel is not yet producing enough power to run SBCC.

Normal Operation:

When the Sun first hits the PV panel, the LED will be Green for 4 seconds then turn Red and begin charging.

In Low-Light, the LED may flicker Green, or Red. When the sunlight reaches charging intensity, the LED will turn solid Red, indicating solar power is fast charging the battery. When the battery charges long enough to reach peak charging voltage, the LED will alternate Red and Green. (Absorption) After the battery has been at peak voltage for a while, the LED will be Green, flickering Red occasionally. (Float) As the Sun goes down, the LED will turn solid Red, blink Red, then shut off. The SBCC is solar panel powered, so it draws no power from the battery at night!

Equalization:

In lighting applications, or with a deep discharge, the Solar Battery Charge Controller will start in Equalize mode upon Sun rise. The Float level will be automatically increased to equalize the batteries cell voltage, then return to normal Float level. This equalization will help insure weak cells are fully charged after a deep discharge. This mode is automatic, no user intervention is required. This typically happens in winter months when nights are longer than days. Battery voltage equalization trigger level < 11.75V

Temperature Compensation:

The Solar Battery Charge Controller should be placed near enough to the batteries to sense the room temperature the batteries are exposed to. When the temperature of the batteries are cooler than 72 degrees F, or 20 degrees C, the float voltage is raised as battery chemistry is slower. At higher temperatures, the float voltage is lowered, to conserve water in wet cells.

This adjustment is automatic and controlled by the micro-controller.

Battery Awareness:

The micro-controller will shut off charging when it detects a battery disconnect event or too low a voltage on the battery port for safe operation. Batteries with open circuit voltage less than 10 volts, may have a bad or shorted cell. Attempting to charge a battery with a shorted cell will over charge the other cells and may lead to boiling dry and/or venting of explosive gasses.

If the Solar Battery Charge Controller refuses to turn on, verify the battery voltage is above 10 volts and the PV panel voltage is above the battery voltage, also check the fuse. The SBCC will remain off until the PV panel voltage is above the battery voltage.

Battery / PV Panel sizing:

The PV Panel should be matched to the battery. In other words, a 150mA panel will never fully charge a 100AH battery, like wise a 300W panel will kill a 7AH battery! Check with your batteries manufacturer to see what rate they recommend charging. Select a panel with a short circuit current rated no more than this rate plus the average load expected during normal operation.

Example: 100W HF radio has a RX current of about 1 amp, a 55AH SLA battery has a recommended charge rate of C/5 (Capacity in AH divided by 5) or about 11 amps, total current needed from PV panel is about 12 amps, so a 200W PV panel(s) would be a good match for this battery and load. Smaller panels will work but provide a slower charging rate.

The above is an example only, use it only as a guide!